

## CLAIMS

### WHAT IS CLAIMED IS:

1 1. A method of determining network routing information based on shared risk link  
2 group information in a data communications network comprising nodes and links, the  
3 method comprising the computer-implemented steps of:  
4 receiving information identifying a failed link in the network;  
5 receiving information defining one or more shared risk link groups to which the failed  
6 link belongs;  
7 accessing a link state database that stores information defining one or more links and  
8 adjacent nodes;  
9 determining whether each link defined in the link state database is in the one or more  
10 shared risk link groups; and  
11 removing an adjacent node from the link state database for any link that is determined  
12 to be in one of the shared risk link groups.

1 2. A method as recited in claim 1, performed as part of determining a shortest path  
2 through the network from a source to a destination.

1 3. A method as recited in claim 1, further comprising the steps of:  
2 determining whether a graph of the data communications network based on the link  
3 state database is disconnected; and  
4 if the graph is disconnected, then determining a new shortest path through the  
5 network to a destination network element without removing any link that has  
6 not been explicitly reported by another network element as failed.

1 4. A method according to any of Claim 1, 2, or 3, further comprising the steps of:  
2 initiating a timer prior to the accessing step;  
3 when the timer expires, determining a new shortest path through the network to a  
4 destination network element.

1     5.     A method of determining network routing information based on shared risk link  
2     group information in a data communications network comprising nodes and links, the  
3     method comprising the steps of:  
4         receiving information identifying a failed link in the network;  
5         receiving information defining one or more shared risk link groups S to which the  
6         failed link belongs;  
7         during computation of a shortest path first tree, after having added a node X to a path,  
8         adding each neighbor  $N_i$  of node X to a tentative tree if and only if a link (X,  
9          $N_i$ ) does not belong to S.

1     6.     A method of determining network routing information based on shared risk link  
2     group information in a data communications network comprising nodes and links, the  
3     method comprising the steps of:  
4         receiving information identifying a failed link in the network;  
5         receiving information defining one or more shared risk link groups to which the failed  
6         link belongs;  
7         initiating computation of a shortest path first tree;  
8         adding a first node to a path as part of the computation;  
9         determining a set of neighbors of the first node; and  
10        adding each neighbor node to a tentative tree if and only if a link between the first  
11        node and the neighbor node does not belong to one of the shared risk link  
12        groups.

1     7.     A method as recited in claim 6, further comprising the steps of:  
2         determining whether a graph representing the data communications network is  
3         disconnected; and  
4         if the graph is disconnected, then determining a new shortest path through the  
5         network to a destination network element without removing any link that has  
6         not been explicitly reported by another network element as failed.

1 8. A method according to any of Claim 6 or 7, further comprising the steps of:  
2 initiating a timer prior to the accessing step;  
3 when the timer expires, determining a new shortest path through the network to a  
4 destination network element.

1 9. A computer readable medium comprising one or more sequences of instructions for  
2 determining network routing information based on shared risk link group information in a  
3 data communications network comprising nodes and links in a data communications network  
4 having as elements links and nodes, which instructions, when executed by one or more  
5 processors, cause the one or more processors to perform the steps of the method of any of  
6 Claims 1, 2, or 3.

1 10. A computer readable medium comprising one or more sequences of instructions for  
2 determining network routing information based on shared risk link group information in a  
3 data communications network comprising nodes and links in a data communications network  
4 having as elements links and nodes, which instructions, when executed by one or more  
5 processors, cause the one or more processors to perform the steps of the method of any of  
6 Claims 5, 6, or 7.

1 11. An apparatus for generating routing information based on shared risk link group  
2 information in a data communications network having as elements nodes and links,  
3 comprising:  
1 means for receiving information identifying a failed link in the network;  
2 means for receiving information defining one or more shared risk link groups to  
3 which the failed link belongs;  
4 means for accessing a link state database that stores information defining one or more  
5 links and adjacent nodes;  
6 means for determining whether each link defined in the link state database is in the  
7 one or more shared risk link groups; and

8 means for removing an adjacent node from the link state database for any link that is  
9 determined to be in one of the shared risk link groups.

1 12. An apparatus as recited in claim 11, implemented as part of a means for determining a  
2 shortest path through the network from a source to a destination.

1 13. An apparatus as recited in claim 11, further comprising:  
2 means for determining whether a graph of the data communications network based on  
3 the link state database is disconnected; and  
4 means for determining, if the graph is disconnected, a new shortest path through the  
5 network to a destination network element without removing any link that has  
6 not been explicitly reported by another network element as failed.

1 14. An apparatus according to any of Claims 11, 12, or 13, further comprising:  
2 means for initiating a timer prior to the accessing step;  
3 means for determining, when the timer expires, a new shortest path through the  
4 network to a destination network element.

1 15. An apparatus for determining network routing information based on shared risk link  
2 group information in a data communications network comprising nodes and links, the  
3 apparatus comprising:  
4 means for receiving information identifying a failed link in the network;  
5 means for receiving information defining one or more shared risk link groups S to  
6 which the failed link belongs;  
7 means for adding, during computation of a shortest path first tree, after having added  
8 a node X to a path, each neighbor  $N_i$  of node X to a tentative tree if and only  
9 if a link (X,  $N_i$ ) does not belong to S.

1 16. An apparatus for determining network routing information based on shared risk link  
2 group information in a data communications network comprising nodes and links, the  
3 apparatus comprising:

4 means for receiving information identifying a failed link in the network;

5 means for receiving information defining one or more shared risk link groups to  
6 which the failed link belongs;

7 means for initiating computation of a shortest path first tree;

8 means for adding a first node to a path as part of the computation;

9 means for determining a set of neighbors of the first node; and

10 means for adding each neighbor node to a tentative tree if and only if a link between  
11 the first node and the neighbor node does not belong to one of the shared risk  
12 link groups.

1 17. An apparatus as recited in claim 16, further comprising:

2 means for determining whether a graph representing the data communications  
3 network is disconnected; and

4 means for determining, if the graph is disconnected, a new shortest path through the  
5 network to a destination network element without removing any link that has  
6 not been explicitly reported by another network element as failed.

1 18. An apparatus according to any of Claims 16 or 17, further comprising:

2 means for initiating a timer prior to the accessing step;

3 means for determining, when the timer expires, a new shortest path through the  
4 network to a destination network element.

1 19. An apparatus for generating routing information in a data communications network  
2 having as elements links and nodes, the apparatus comprising:  
3 one or more processors;  
4 a network interface communicatively coupled to the processor and configured to  
5 communicate one or more packet flows among the processor and a network;  
6 and  
7 a computer readable medium comprising one or more sequences of instructions for  
8 generating routing information which instructions, when executed by one  
9 more processors, cause the one or more processors to perform the steps of the  
10 method of any of claims 1, 2, or 3.

1 20. An apparatus for generating routing information in a data communications network  
2 having as elements links and nodes, the apparatus comprising:  
3 one or more processors;  
4 a network interface communicatively coupled to the processor and configured to  
5 communicate one or more packet flows among the processor and a network;  
6 and  
7 a computer readable medium comprising one or more sequences of instructions for  
8 generating routing information which instructions, when executed by one  
9 more processors, cause the one or more processors to perform the steps of the  
10 method of any of claims 5, 6, or 7.